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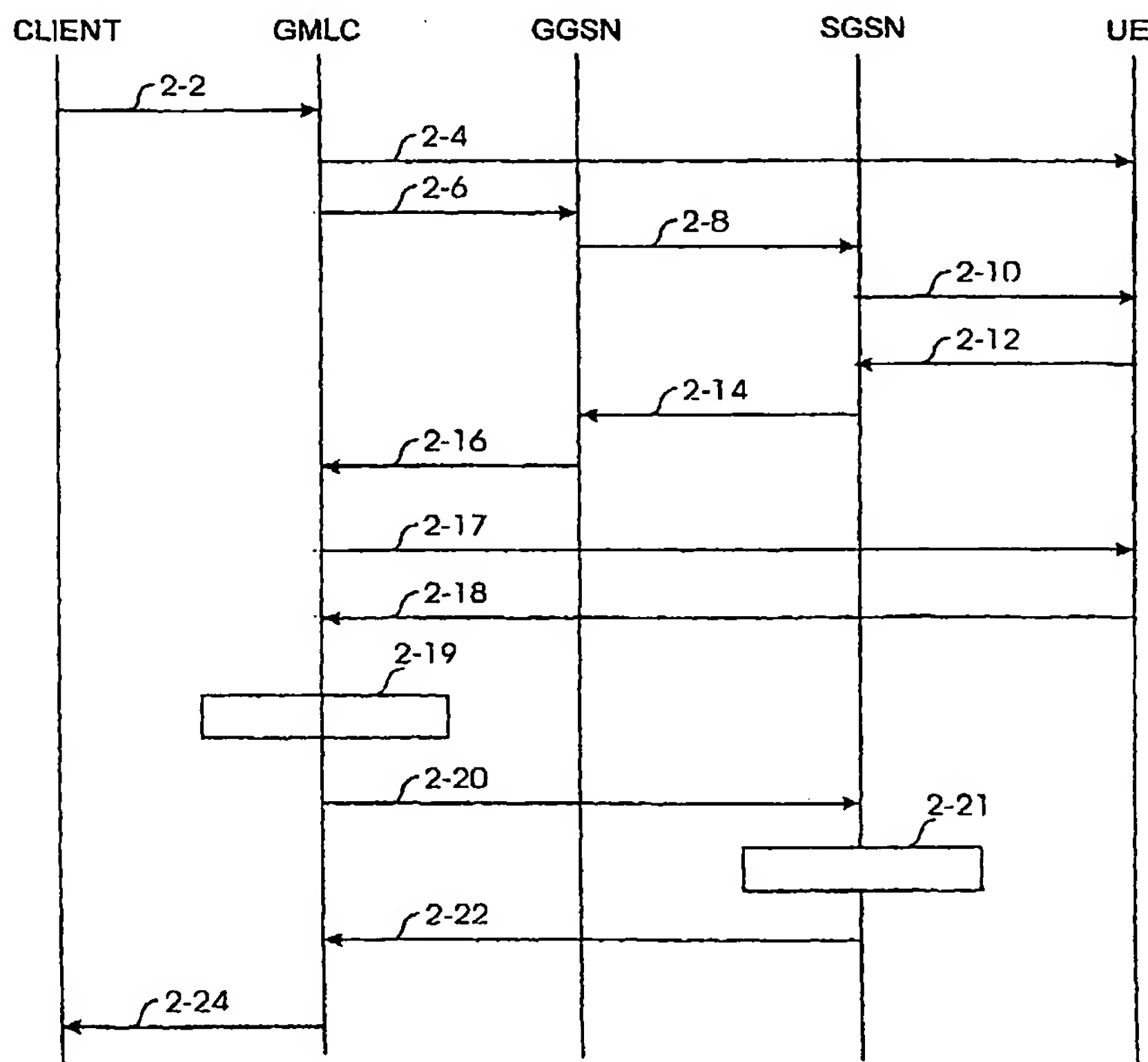
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(54) Title: **METHOD OF INVOKING PRIVACY ON TELECOMMUNICATIONS NETWORK**



(57) Abstract: The invention relates to a method of invoking privacy related to a user equipment (UE) in a telecommunications network which method comprises the steps of sending (2-2) a location service request from a location service client (Client) to a location service centre (GMLC); said location service centre (GMLC) sending directly to a user equipment (UE) to be located a privacy request prompting the user of said user equipment (UE) to accept or reject the specific location service request; said user equipment (UE) sending to said location service centre (GMLC) a privacy request response; said location service centre (GMLC) providing the location information to said requesting client (Client), if said location service request is accepted in said privacy response, and rejecting the location service request otherwise.

WO 02/054814 A1

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METHOD OF INVOKING PRIVACY ON TELECOMMUNICATIONS NETWORK

FIELD OF THE INVENTION

The present invention relates to a method of invoking privacy on a
5 telecommunications network, and more particularly to a method of invoking
privacy in the packet-switched domain of a telecommunications network.

BACKGROUND OF THE INVENTION

Mobile communications systems provide mobile users with means
to communicate from an arbitrary location within a Public Land based Mobile
10 Network PLMN. Initially, mobile communications systems offered more or less
the same services as do wired communications systems, i.e. voice calls, data
calls and fax calls. The ever-changing location of the mobile user was not
seen as a useful piece of information, which the wired communications
systems cannot deliver. A more valid vision is that by making full use of the
15 user's location information, mobile communications systems can achieve
competitive advantages over wired communications systems. This information
can be used for customizing certain value-added services according to the
user's location. Such location-specific value-added services include localised
weather forecasts, entertainment programs, timetables, navigation and
20 locating a mobile user in an emergency. Additionally, the user's location can
also be used for law-enforcement purposes.

Within the context of this application, the following conventions will
be used. *Location management* refers to the task of tracking a user
equipment's location in terms of location/routing areas and cell/network
25 element identifiers. Thus, location management is performed in any mobile
communications system, and it is a necessary task for routing calls to a mobile
subscriber. In contrast, *location services*, LCS, refer to the task of tracking a
user equipment's location in terms of geographical coordinates. This task is
not necessary for routing calls. Rather, it is a value-added information service,
30 or it can be used for producing value-added services.

According to the state of the art of location services in the CS
(Circuit-Switched) domain, it is possible for the network (MSC, Mobile Services
Switching Centre) to request a subscriber to accept or reject that the location
of the mobile telephone is revealed to an LCS Client. However, a
35 corresponding mechanism does not yet exist in the UMTS (Universal Mobile

Telecommunications System) packet-switched domain or in the GPRS (General Packet Radio Service) system.

In the circuit-switched domain MSC uses supplementary services signalling for invoking the privacy request. This is not a possible solution in the packet-switched domain, since supplementary services and corresponding signalling are not seen very useful in the packet-switched domain.

BRIEF DESCRIPTION OF THE INVENTION

It is thus an object of the present invention to provide a method and an apparatus for implementing the method so as to solve the above problem. The object of the invention is achieved by a method and an arrangement which are characterized by what is stated in the independent claims. The preferred embodiments of the invention are disclosed in the dependent claims.

The invention is based on the idea of a service centre which provides location services for clients, such as an GMLC (Gateway Mobile Location Centre) element in the packet-switched domain itself, requesting the user to accept or reject a location request, before the location determination process is started.

It is an advantage of the method and the arrangement of the invention that no modifications are needed in telecommunications network elements, such as the support nodes of GPRS. The invention needs support only from the location service centre and from the user equipment.

Another advantage of the method and the arrangement of the invention is that it is also applicable to the circuit-switched domain, e.g. in parallel with standard location service mechanisms.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following the invention will be described in greater detail by means of preferred embodiments with reference to the accompanying drawings, in which

Figure 1 presents general LCS network architecture

Figure 2 shows a signalling procedure for invoking an early privacy request.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1 illustrates a general LCS network architecture. GERAN (GSM, Global System for Mobile Communications, Enhanced Radio Access

Network) and UTRAN (UMTS Terrestrial Radio Access Network) are taking care of radio access functionalities. MSC and SGSN (Serving GPRS Support Node) are switching entities. GMLC and LCS Client are needed to provide location based services. Apart from MLC (Mobile Location Centre), i.e. GMLC, 5 the remaining blocks are known from prior art GSM and GPRS systems. UE (User equipment) or MS (Mobile Station) is normally a mobile phone, but it can be any entity which uses the standard air interface, e.g. a measurement unit connected to the network through the air interface.

Figure 2 illustrates a block diagram about a preferred embodiment 10 of the invention. The invention will be described in connection with the GPRS system. However, it should be understood that the GPRS system has been chosen only for the purposes of illustration, and the invention is applicable to any telecommunications system supporting packet-switched connections and/or circuit-switched connections.

15 Figure 2 shows a signalling procedure for invoking an early privacy request. In step 2-2 the LCS Client sends a location request to GMLC in order to obtain information about the current location of UE. The LCS client can be a location based application server, such as e.g. an emergency exchange or a shop in a shopping mall.

20 If the LCS client indicates the address of the target UE (User Equipment) in the IMSI (International Mobile Subscriber Identification) or the MSISDN (Mobile Subscriber International Integrated Services Digital Network Number) format, GMLC can use any of these in the LCS routing request to HLR. If the address of the target UE is in IP (Internet Protocol) format, GMLC 25 must find out the mapping of this possibly dynamic IP address to IMSI or MSISDN. If the address of the target UE is a static IP address or a logical name such as name@domain.com, GMLC could obtain the corresponding MSISDN or IMSI from a special DNS (Domain Name Server) server in the backbone network.

30 According to the invention GMLC asks the user of the mobile terminal to accept or reject this location request from the indicated LCS client in question by sending a privacy request directly to UE. In order to do that, GMLC first has to establish a connection end-to-end with the target UE, that can be used for the privacy request signalling. GMLC sends a service request 35 to the appropriate GGSN indicating MSISDN or IMSI or the IP address (if known) of the target UE. GGSN will process this request as a normal network-

requested PDP context activation including paging and authentication of target UE, if there is no PDP established with the target UE from before. The steps from 2-6 to 2-16 are normal IP protocol and GPRS signalling steps. In steps 2-6 to 2-10 a PDP (Packet Data Protocol) activation and transport signal is proceeded from GMLC to UE via network elements GGSN and SGSN. In steps 2-12 to 2-16 data path activation is proceeded from UE to SGSN, from SGSN to GGSN and finally from GGSN to GMLC. In signalling step 2-17 GMLC sends the privacy request to UE.

In step 2-18 UE sends a privacy invocation response to the GMLC.

10 The response indicates whether the user is willing to yield his position to the indicated LCS Client or not. In case the user declines to reveal her location information to the indicated LCS client, GMLC shall stop the location process and send a message to the LCS Client informing it about the user rejection.

In step 2-19 GMLC requests from HLR (Home location Register) the address of SGSN to which GMLC should send the location request. In step 2-20 GMLC sends a Locate UE Request to correct SGSN. According to the invention and its embodiments GMLC may add in the Locate UE Request to SGSN the information that the user has already accepted to reveal the location information to the indicated LCS client. In step 2-21 SGSN may inquire LCS subscription data regarding the target UE from HLR. HLR sends to SGSN the LCS subscription data, and the LCS subscription data may indicate whether SGSN is permitted to provide GMLC with the location information of the target UE at all or whether SGSN should first perform a privacy invocation request. If permitted, SGSN inquires the location information of the UE from the access network, BSC/SMSC in GSM or RNC in UMTS.

According to the invention and its embodiments GMLC has already informed SGSN in step 2-20 about the user permission for providing the location information to the indicated LCS Client and thus SGSN does not have to inquire that information again from UE in this case. In step 2-22 UE location information response is returned to GMLC, which in step 2-24 returns the target UE location information to the requesting entity, i.e. to the LCS Client.

In this invention GMLC could also ask HLR which privacy options are valid for the target UE. The new feature is the fact that the privacy check is made by GMLC instead of MSC or SGSN. GMLC need not perform the privacy request described here, if the subscriber data in HLR do not require that

operation. The current MAP specifications do not support subscriber data transport between HLR and GMLC, and this new MAP functionality could be seen as a part of this invention. If GMLC is not able to check with HLR what the privacy options of the target UE are, it normally invokes the privacy request
5 as described here.

In order to ensure that only an authorized GMLC and/or a GMLC known to the user is able to perform the privacy request, the signalling exchange between GMLC and the target UE may be authorized and secured. There are several possible methods to do this: IP sec, the digital signature, or
10 Pretty Good Privacy (PGP). When PGP is used, it is assumed that the user of the target UE is aware of the encryption key used by GMLC in order to be able to decrypt the privacy request from GMLC.

Although GMLC can be in other operators' network anywhere in the world, for preventing illegal requests, a serving or a home operator may use
15 the above-mentioned authorization and/or securing methods. If GMLC is located in the same operator's network where the user is currently served, the invention will be highly reliable from privacy perspective. However, there may be some limitations if LCS services are not available in PS side and the user is roaming. However, these limitations are minor ones compared to the
20 advantages achieved by the invention.

As described above, the main idea of the invention is that GMLC requests itself the user to accept or reject the location request before the location determination process. The signalling between GMLC and UE has been shown to be direct. There is no need for any kind of modifications to the
25 SGSN and GGSN. Instead modifications in the GMLC and user equipment are needed.

It should be noted that this invention is applicable also to the circuit-switched domain and can be used in parallel with the standardized solution. In the circuit-switched domain GMLC may set up a call to UE and request the
30 user to accept or reject the location determination, using speech announcements, for instance.

It will be obvious to a person skilled in the art that, as the technology advances, the inventive concept can be implemented in various ways. The invention and its embodiments are not limited to the examples
35 described above but may vary within the scope of the claims.

CLAIMS

1. A method of invoking privacy related to a user equipment (UE) in a telecommunications network, characterized by the steps of:
sending (2-2) a location service request from a location service
5 client (Client) to a location service centre (GMLC);
said location service centre (GMLC) sending (2-4) directly to a user equipment (UE) to be located a privacy request prompting the user of said user equipment (UE) to accept or reject the specific location service request;
said user equipment (UE) sending to said location service centre
10 (GMLC) a privacy response (2-18);
said location service centre (GMLC) providing the location information to said requesting client (Client), if said location service request is accepted in said privacy response, and rejecting the location service request otherwise.
- 15 2. A method according to claim 1, characterized in that said telecommunications network is a packet-switched network.
3. A method according to claim 1 or 2, characterized in that said user equipment (UE) is packet-mode user equipment in a packet-switched mobile communications network, and that said privacy request and
20 said privacy response are routed between said user equipment and said service location centre through a gateway and serving nodes of said packet-switched mobile communications network.
4. A method according to claim 3, characterized in that responsive to receiving said privacy response from said location
25 service centre (GMLC) at said a gateway node, a packet data protocol context is generated (2-6 ... 2-16) for said user equipment in said packet switched mobile communications network.
5. A method according to claims 1 to 4, characterized in that said location service centre (GMLC) informs the serving support node (SGSN)
30 of the said packet switched network that the user has already agreed to reveal her location information to the indicated client (Client) so that the serving support node (SGSN) needs not to perform a privacy invocation with the target user equipment (UE).
6. A method according to any one of claims 1 to 5,
35 characterized in that the exchange of said privacy request and privacy response between said location service centre and said user equipment (UE)

is authorized and/or secured, preferably by methods such as IP sec, the digital signature or Pretty Good Privacy (PGP).

7. A method according to claim 6, characterized in that said authorization and/or securing is done by one of the following methods: IP sec, the digital signature or Pretty Good Privacy (PGP).

8. A method according to claim 1 or 7, characterized in that the telecommunications network is a circuit-switched network.

9. A location service centre (GMLC) for providing information on the location of user equipment (UE) in a telecommunications network in response to location service requests received from location service clients, characterized in that

said location service centre (GMLC) is responsive to such location service request for sending directly to a user equipment (UE) to be located a privacy request prompting the user of said user equipment (UE) to accept or reject the specific location service request;

said location service centre (GMLC) is arranged to provide the location information to said requesting client (Client) responsive to a privacy response of said user equipment (UE), if said location service request is accepted in said privacy response, and to reject said location service request otherwise.

10. A location service centre according to claim 9, characterized in that said telecommunications network is a packet-switched network.

11. A location service centre according to claim 9 or 10, characterized in that said user equipment (UE) is packet-mode user equipment in a packet-switched mobile communications network, and that said privacy request and said privacy response are routed between said user equipment (UE) and said service location centre through gateway and serving nodes of said packet-switched mobile communications network.

FIG. 1

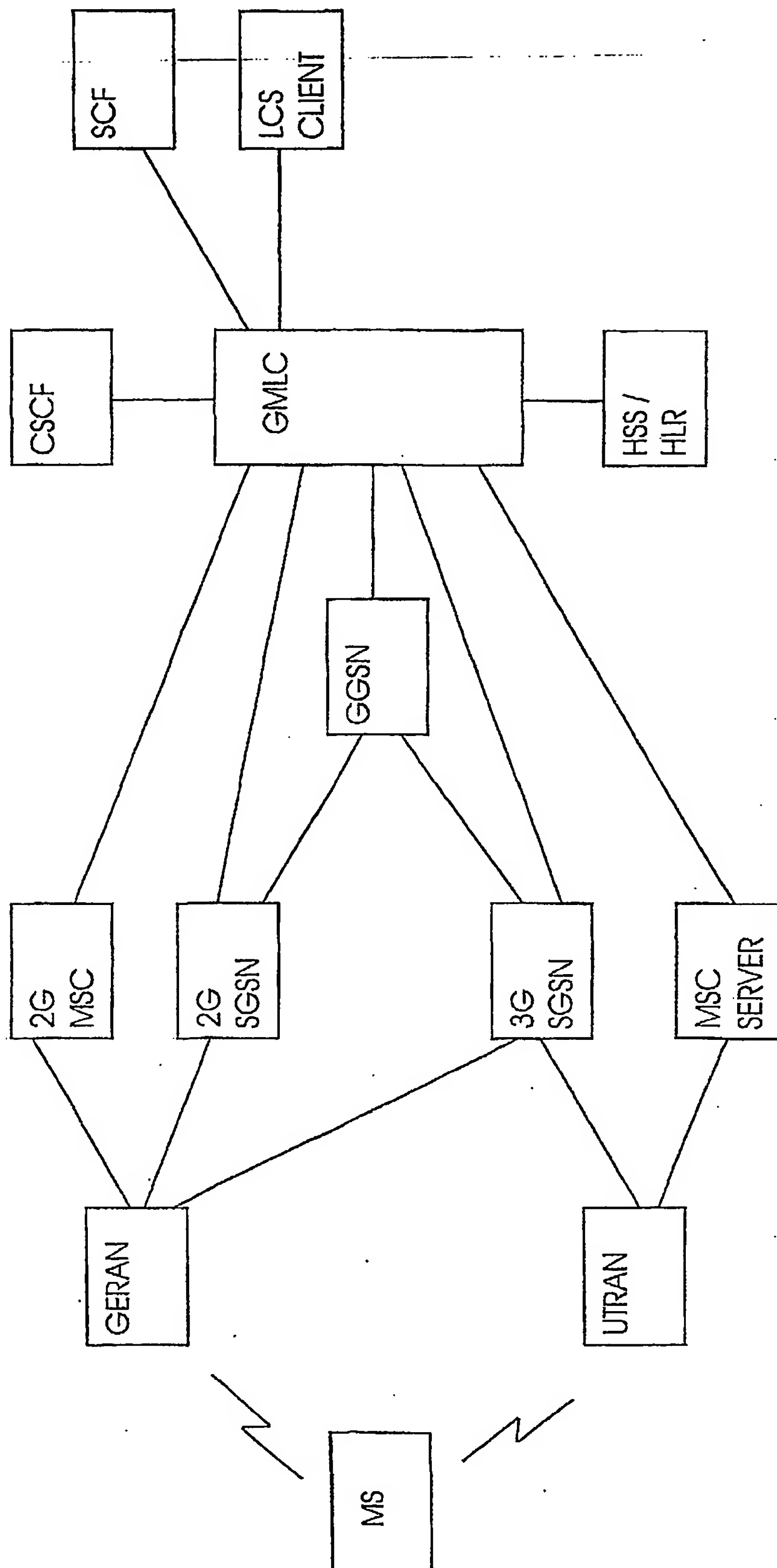
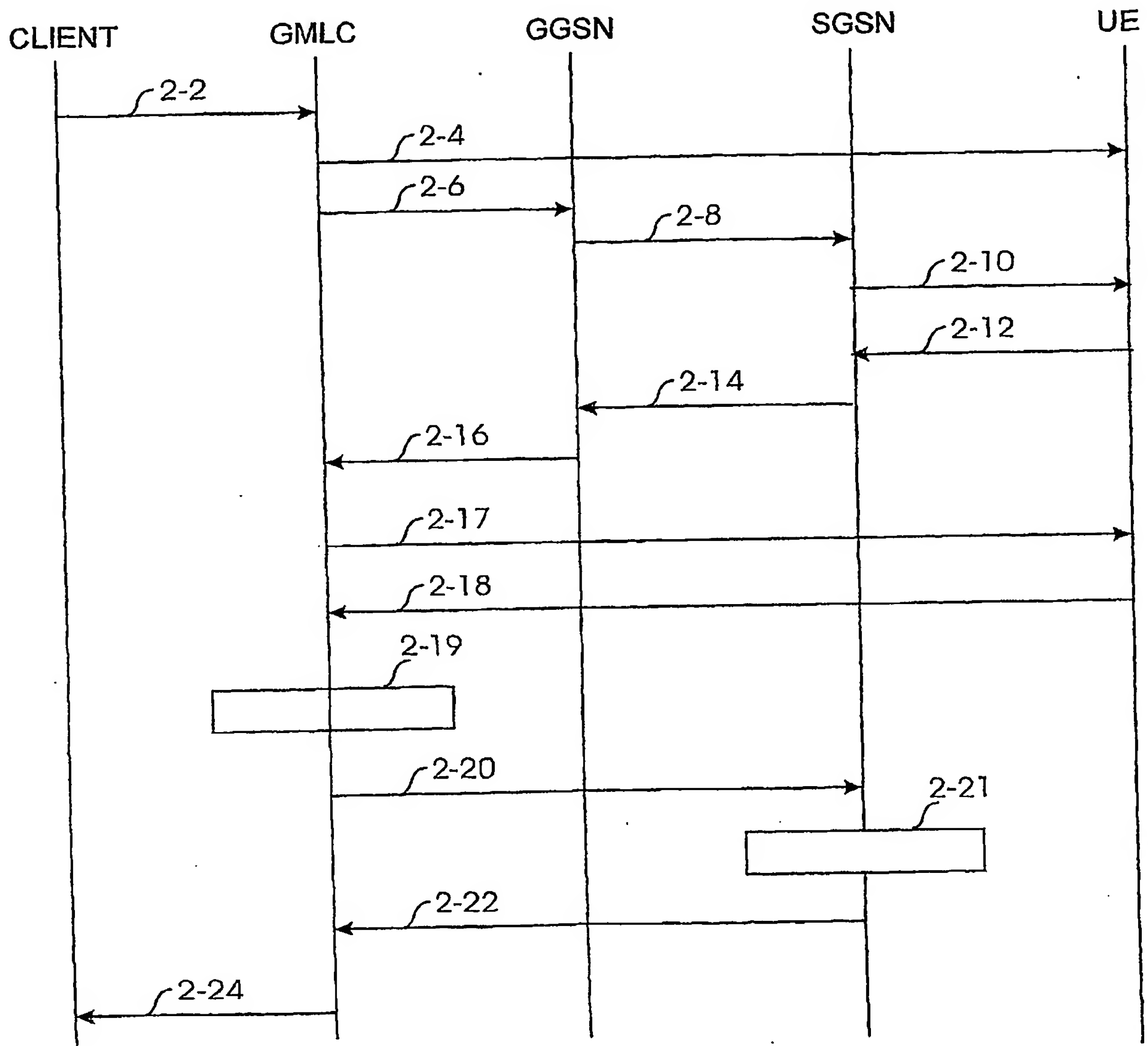


FIG. 2



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 02/00003

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 7/38
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	WO 9955115 A1 (ERICSSON INC.), 28 October 1999 (28.10.99), page 4, line 10 - line 11; page 5, line 5 - line 16; page 8, line 28 - page 9, line 13 --	1-5,8-11
X	WO 9955114 A1 (ERICSSON INC.), 28 October 1999 (28.10.99), page 11, line 13 - page 12, line 3 --	1-5,8-11

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search	Date of mailing of the international search report
13 May 2002	27 -05- 2002
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Stefan Hansson/MN Telephone No. +46 8 782 25 00

International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT
Information on patent family members

01/05/02

International application No.
PCT/FI 02/00003

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